

WHAT IS CLAIMED IS:

1. An apparatus for obtaining coherent scatter imaging data of an examination object comprising:

5 - a radiation source arrangement for creating a radiation beam of ionizing radiation centered around an axis of symmetry, which radiation beam is directed through said examination object; and

10 - a radiation detector arrangement comprising a stack of line detector units, each being directed towards a small portion of a trajectory of said radiation beam in said examination object to allow a substantially fan-shaped ray bundle of said radiation beam as coherently scattered in said examination object to enter the line detector unit and be detected therein; wherein

15 - each of said line detector units has an elongated opening for entry of the respective fan-shaped coherently scattered ray bundle; a row of individual detector elements arranged essentially parallel with said elongated opening; and is of the kind wherein charges or photons generated by interactions
20 between the respective fan-shaped coherently scattered ray bundle and a detection medium within the line detector unit and traveling in a direction essentially perpendicular to the respective fan-shaped coherently scattered ray bundle, are detected by said row of individual detector elements; and

25 - said line detector units and their respective individual detector elements are formed and oriented so as to allow simultaneous recording of coherent scatter imaging data sufficient to form a plurality of one-dimensional images, each being composed of radiation as coherently scattered in said
30 examination object in a respective angle.

2. The apparatus of claim 1 wherein said line detector units are directed towards different positions along the trajectory of said radiation beam in said examination object to allow different fan-shaped ray bundles of said radiation beam as coherently scattered in different small portions of said examination object to enter said line detector units and be detected therein so that a signal from each of said line detector units is needed to form one of said plurality of one-dimensional images.

3. The apparatus of claim 2 wherein

- the row of detector elements of each of said line detector units is essentially orthogonal to a plane, in which said axis of symmetry and said stack of line detector units are located; and

- the detector elements of each of said line detector units are separated, elongated and directed so their extension lines converge in a respective point in said different small portions, and detect therefore different angular portions of the fan-shaped ray bundle entered into the respective line detector unit so that a signal from each of said line detector unit is needed to form each of said plurality of one-dimensional images.

4. The apparatus of claim 2 wherein said line detector units are directed towards different positions along the trajectory of said radiation beam in said examination object, which directions define angles with respect to said axis of symmetry in the plane, in which said axis of symmetry and said stack of line detector units are located, which angles have the same magnitude.

5. The apparatus of claim 2 wherein said radiation detector arrangement comprises a detector unit arranged in the path of said radiation beam to measure the transmission through said examination object simultaneously with said simultaneous recording of coherent scatter imaging data.

6. The apparatus of claim 2 wherein each of said line detector units is a gaseous-based parallel plate detector.

7. The apparatus of claim 6 wherein each of said line detector units is an avalanche amplification detector.

8. The apparatus of claim 2 further comprising a device for moving said radiation source and said radiation detector arrangement relative said examination object in a direction in a plane orthogonal to said axis of symmetry, while said line detector units are together adapted to record a plurality of line images of radiation as scattered in said examination object in a plurality of different angles to thereby produce coherent scatter imaging data sufficient to form a plurality of two-dimensional images, each being composed of radiation as coherently scattered in said examination object in a respective angle.

9. The apparatus of claim 2 further comprising a device for moving said radiation source and said radiation detector arrangement relative said examination object in two different directions in a plane orthogonal to said axis of symmetry, while said line detector units are together adapted to record a plurality of line images of radiation as scattered in said examination object in a plurality of different angles to thereby produce coherent scatter imaging data sufficient to form a plurality of three-dimensional images, each being composed of radiation as coherently scattered in said examination object in a respective angle.

10. The apparatus of claim 1 wherein

- said radiation beam of ionizing radiation has a substantially line-shaped cross-section;

- the openings of said line detector units are parallel with the substantially line-shaped cross-section of said radiation beam;

- said line detector units are directed towards the same small portion of the trajectory of said radiation beam in said examination object; and

- the detector elements of each of said line detector units are separated, elongated and arranged to provide coherent scatter imaging data sufficient to form one of said plurality of one-dimensional images.

11. The apparatus of claim 10 wherein said line detector units are directed towards the same small portion of the trajectory of said radiation beam in said examination object; which directions define different angles with respect to said axis of symmetry in a plane, in which said axis of symmetry and said stack of line detector units are located.

12. The apparatus of claim 10 wherein said radiation detector arrangement comprises a detector unit arranged in the path of said radiation beam to measure the transmission through said examination object simultaneously with said simultaneous recording of coherent scatter imaging data.

13. The apparatus of claim 10 wherein each of said line detector units is a gaseous-based parallel plate detector.

14. The apparatus of claim 13 wherein each of said line detector units is an avalanche amplification detector.

15. The apparatus of claim 10 further comprising a device for moving said radiation detector arrangement and optionally said radiation source relative said examination object, while said line detector units are together adapted to record a plurality
5 of line images of radiation as scattered in said examination object in a plurality of different angles to thereby produce coherent scatter imaging data sufficient to form a plurality of images, each being composed of radiation as coherently scattered in said examination object in a respective angle.

10 16. A method for obtaining coherent scatter imaging data of an examination object comprising the steps of:

- directing a radiation beam of ionizing radiation centered around an axis of symmetry through said examination object; and

15 - directing each one of a plurality of line detector units arranged in a stack towards a small portion of the trajectory of said radiation beam in said examination object to allow a substantially fan-shaped ray bundle of said radiation beam as coherently scattered in said examination object to enter the
20 line detector unit; and

- detecting said fan-shaped ray bundle entered into said line detector units, wherein

- each of said line detector units has an elongated opening for entry of the respective fan-shaped coherently scattered ray bundle; a row of individual detector elements arranged
25 essentially parallel with said elongated opening; and is of the kind wherein charges or photons generated by interactions between the respective fan-shaped coherently scattered ray bundle and a detection medium within the line detector unit
30 and traveling in a direction essentially perpendicular to the

respective fan-shaped coherently scattered ray bundle, are detected by said row of individual detector elements; and

- said line detector units and their respective individual detector elements are formed and oriented so as to allow simultaneous recording of coherent scatter imaging data sufficient to form a plurality of one-dimensional images, each being composed of radiation as coherently scattered in said examination object in a respective angle.

17. The method of claim 16 wherein

- said line detector units are directed towards different positions along the trajectory of said radiation beam in said examination object to allow different fan-shaped ray bundles of said radiation beam as coherently scattered in different small portions of said examination object to enter said line detector units and be detected therein;

- the row of detector elements of each of said line detector units is essentially orthogonal to a plane, in which said axis of symmetry and said stack of line detector units are located; and

- the detector elements of each of said line detector units are separated, elongated and directed so their extension lines converge in a respective point in said different small portions, and detect therefore different angular portions of the fan-shaped ray bundle entered into the respective line detector unit so that a signal from each of said line detector unit is needed to form each of said plurality of one-dimensional images.

18. An apparatus for obtaining coherent scatter imaging data of an examination object comprising:

- a radiation source arrangement for creating a collimated radiation beam of ionizing radiation centered around an axis of symmetry, which radiation beam is directed through said examination object; and

5 - a line detector unit being directed towards a small portion of the trajectory of said radiation beam in said examination object to allow a substantially fan-shaped ray bundle of said radiation beam as coherently scattered in said examination object to enter the line detector unit and be detected
10 therein; wherein

- said line detector unit has an elongated opening for entry of the fan-shaped coherently scattered ray bundle; a row of individual detector elements arranged essentially parallel with said elongated opening; and is of the kind wherein
15 charges or photons generated by interactions between the fan-shaped coherently scattered ray bundle and a detection medium within the line detector unit and traveling in a direction essentially perpendicular to the fan-shaped coherently scattered ray bundle, are detected by said row of individual
20 detector elements;

- the row of detector elements of said line detector unit is essentially orthogonal to said axis of symmetry; and

- the detector elements of said line detector unit are separated, elongated and directed so their extension lines
25 converge in a single point in said small portion, and detect therefore different angular portions of the fan-shaped ray bundle entered into the line detector unit.

19. The apparatus of claim 18 wherein said line detector unit is a gaseous-based parallel plate detector.

20. The apparatus of claim 19 said line detector units is an avalanche amplification detector.